

SWBAT


be prepared to finalize
their cart friction project

Sep 4-7:31 AM

Welcome!!!

SECA CP Physics
Monday 29 February 2016

*Centering
(jokes)*

 PEDs with Passing

H. Leslie Grebe
Room C-244


- Show me SchoolView if you want phone in class...
- GET A COMPUTER and log in
- Hmwk: [FINAL PROJECT is due MONDAY!!!!](#)

Opening Activity - Quick Write:

If I have a displacement vector of size 31 meters going 35 deg North of East, how do we find d_x and d_y ?

(Ever heard of SOH CAH TOA? How would that work on this triangle?)

"...and then friction goes, 'Oh you're looking good today gravity!' and then gravity says, 'Of course I am! I'm an attractive force!...'"



your cards
somecards.com

Sep 7-7:04 AM

State the Challenge

We are trying to figure out what the friction of the cart is, we had a pulley which was attached to the table, we had a timer which told us the time of when it stopped we had the string attached to the cart and we had weights which was being put inside the cart along with slo-pro to slow down what and how it stopped or started.

MATERIALS

- > Cart
- > Pulley
- > Rope
- > Weights
- > Timer
- > Slo-Pro app

Method:

One person held the cart with the mass at its farthest displacement away from the end of the pulley.

Then we marked where the starting point was with a piece of tape.

At the end string there we attached a weight to pull.

Then another person gets ready to stop the cart right when it hits the end of the pulley system.

One more person sets up the Slo-Pro App and the timer.

The same person starts the timer and Slo-Pro then signals the person holding the cart to let go when they are ready.

Then after the cart started going the other person waiting for the cart to stop: stops it when the cart hits the end of the pulley system.

Afterwards, we look back at the Slo-Pro app and get the times the cart was let go and the time the cart hits the end of the pulley system.

Data:

Displacement: 69.7 cm
Velocity Initial: 0 m/s
Mass in cart: 1000 g

Trials	Release Time	Stop Time	Change in Time
1	2.3 sec	7.8 sec	6.5 sec
4	3.9 sec	7.7 sec	3.8 sec

Assumptions:

We assumed the table was smooth and the equipment would have high consistency.

We used UAM equations in our results, so we are assuming the acceleration is _____.

Results:

EACH CALC:

- WHAT YOU PUT IN
- WHAT EQUATION
- WHAT YOU GOT OUT

GLOSSARY

- MASS
- ACCELERATION
- FRICTION

Feb 26-9:09 AM

Pg 66?

Look at page 65 - how does knowing "a" help you find friction?

NET FORCE MAKES ACCELERATION

ACCELERATION

UNBALANCED

BALANCED

30g = mass = .030 kg

$F_{\text{grav}} = W = m \cdot (-9.81 \text{ m/s}^2)$

$W = -T = 2943 \text{ N}$

$[F_{\text{NET}}] = T - F_{\text{FRIC}} = m_{\text{cart}} \cdot a$ (TEMPLATE)

1.1016 kg

$0.2943 \text{ N} - F_{\text{FRIC}} = 0.089164198 \text{ N}$

$0.2943 \text{ N} = 0.089164198 \text{ N} + F_{\text{FRIC}}$

$-0.089164198 \text{ N} - 0.089164198 \text{ N}$

Quick circle - collaboration?
in YOUR words...

Feb 24-8:21 AM

What we should have solid:

Memorize our ~~5~~⁸ vocab cards, units, vector or not, definition, formula

Be able to answer distance vs displacement questions

Be able to make measurements of real-life motion. Know what is likely to make timing things difficult and how to get more reliable timing results

Be able to convert between miles and meters, between hours, minutes, and seconds

Be able to calculate speed = dist/time and velocity = disp/time

Know what all of the symbols in the UAM equations stand for and mean

Be able to turn a UAM word problem into a list of knowns and unknowns

Be able to pick the equation with those 4 things in it

Be able to put the knowns into that equation

(Be able to solve for the unknown)

→ PROJECTILES: v_x IS CONSTANT; $a_y = -9.8 \text{ m/s}^2$ ^{v_y CHANGES} PG 42

PG 43 TIME, Δt , CONNECTS x & y

PG 49 VECTORS INTO x & y , ADD VECTORS
SOH - CAH - TOA

PG 59 DIFFERENCE BETWEEN MASS & WEIGHT

PG 61 NET FORCE

PG 63 FREE BODY DIAGRAMS

$$F = m \cdot a$$

QW every day to review - gather responses to front board.

Dec 4-9:15 AM

Unit	Left-Side Items	Page	Right-Side Items	Page
	REFLECTION ON NOTES	2	EDITED ADAM SAUGE	3
	HOW FAR FROM BRIDGE	4	"FORT STUEBEN"	5
	REFLECTION ON NOTES	6	HAWK: BASE UNITS	7
	PR: DISTANCE & DISPLACEMENT	8	HAWK: FP DISPLACEMENT	9
	DIAGRAM & STEPS	10	TIMING & ERROR	11
	SUMMARY OF TIMING	12	HOW TO BUILD A TABLE	13
	PR: CONVERTING SLOWS	14	HAWK: FP CONVERSIONS	15
	PR: VELOCITY & SPEED	16	HAWK: FP SPEED & VELOCITY	17
	SPEED WORD PROBLEMS	18	ALGEBRA FOR PHYSICS	19
	LAB JOURNAL 10/7	20	LAB JOURNAL 10/8	21
	...		HAWK: FP GRAPH POSITION	23
	LAB JOURNAL 10/12	24	EXPERIMENT RUBRIC	25
	26 USE FOR PROJECT	26		
	OBSERVATIONS OF ORF	28	FP: INTRO TO ACC.	29
	REVIEW FOR TEST	30	BALL ON RAMP	31
	VECTORS, DIRECTION	32	FP: BASIC ACC EXAMPLE	33
	PRACTICE UAM	34	FP: INTRO TO UAM	35
	FALLING OBJECTS PACKET	36	FP: INTRO TO FREEFALL	37
	MY FREE FALL WORD PROBLEM	38	3-ACT FALLING GLOWSTICK	39
	Toy popper experiment	40	Free fall class solutions	41
	Launched vs. Dropped	42	FP: INTRO TO PROJECTILE MOTION	43
	PROJECTILE SIMULATOR	44	FP: PROJ. MOTION PROBLEM	45
	PROJ. L PRACTICE PROBS.	46	PROJECTILES PRACTICE	47
	OUR VECTOR PRACTICE	48	FP - VECTOR COMPONENTS	49
	VECTOR PACKET	50	NOTES ON ADDING VECTORS	51
	MEASURE LAUNCHER	52	NOTES ON FINDING v_f & S_2	53
	OBSERVATIONS OF OBJECTS	54	RULES OF PHYSICS NOTES	55
	NEWTON'S 1 ST LAW	58	CONFUSING QUANTITIES	59
	WKSHJ: 2-1	60	NET FORCE	61
	PHET FORCES IN 1d	62	FREE-BODY DIAGRAMS	63
	PACKET: F.B.D.	64	FINDING FRICTION IN CART	65
	DATA/MEASURING CART	64		

Sep 5-9:09 AM

FRICTION PROJECT CHALLENGE

IF BY (MON 2/29)

- ALL PEOPLE W/ 2+ DAYS ATTENDANCE PER WEEK
 - GET >60% (PASSING) BASED ON PROJECT RUBRIC
- THEN CLASS PIZZA PARTY @ LUNCH TIME (\$2/person)

Feb 12-10:02 AM

PG 65 FINDING FRICTION ON CAR

Things we know:

$$F = m \cdot a$$

$$F_{\text{grav}} = W = m \cdot a_g$$

$$\text{Puller } m = 50 \text{ g} \times \frac{1 \text{ kg}}{1000 \text{ g}} = .050 \text{ kg}$$

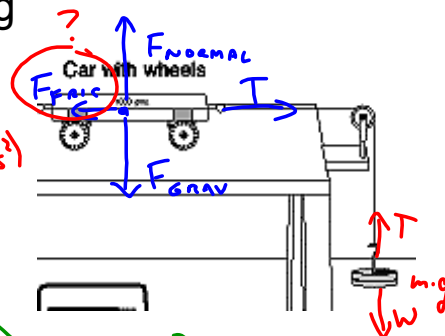
$$\text{Chunk } m = 1000 \text{ g} = 1 \text{ kg}$$

$$\text{Cart } m = 101.6 \text{ g}$$

$$F_{\text{grav}} = (m_{\text{car}} + m_{\text{chunk}}) \cdot (-9.8 \text{ m/s}^2)$$

Measure:

- distance on table
- time to travel from rest



NEWTON'S 1ST LAW:

- OBJECTS KEEP DOING WHAT THEY WERE DOING UNLESS THERE IS A NET FORCE

↓
MAKES CAR ACCELERATE

Feb 11-10:19 AM

PG 64-65

What do we want to know about the motion of our cart? How can we get the best possible answer?

(Blue = thoughts before measuring)

- STOP WATCH = LET CAR GO?
- [Stop Pro INSTEAD] $\times 2$?
- AS MUCH DISTANCE AS POSSIBLE
- LIGHTEST MASS THAT accelerates $30g$
- MAKE SURE CART IS STRAIGHT

(black = thoughts while measuring)

- MARKED BEGINNING WITH TAPE, BUT IT ADDED FRICTION & CART DIDN'T MOVE, SO MOVED TAPE OVER
- HARD TO TOUCH/STOP CART EXACTLY AT BACK END

TRIAL 1: 76 cm, 20g
 $t_1 = 2.9$ s. $t_2 = 9.4$ s.
 $\Delta t = 6.5$ s.

TRIAL 2: 76 cm, 20g
 $t_1 = 3.3$ sec $t_2 = 8.7$ s.
 $\Delta t = 5.4$ s.

TRIAL 3: 69.7 cm, 30g
 $t_1 = 3.3$ s. $t_2 = 7.8$ s.
 $\Delta t = 4.5$ s.

TRIAL 4: 69.7 cm, 30g
 $t_1 = 3.9$ s. $t_2 = 7.7$ s.
 $\Delta t = 3.8$ s.

AVERAGE $\Delta t = 4.15$ s.

WHY NOT THE SAME?

DELTA → "CHANGE IN"
 $t_2 - t_1$ START

Feb 18-8:03 AM

"WHAT'S THE FRICTION FORCE?"

What are the big physics ideas we need to get the answer for the class project???

FREE BODY DIAGRAM

$F = m \cdot a$ $\rightarrow W = m \cdot g$

WHAT CAUSES a ? UNBALANCED / NET FORCES

UAM: EQUATIONS THAT CONNECT

Δx , V_i , V_f , Δt , a

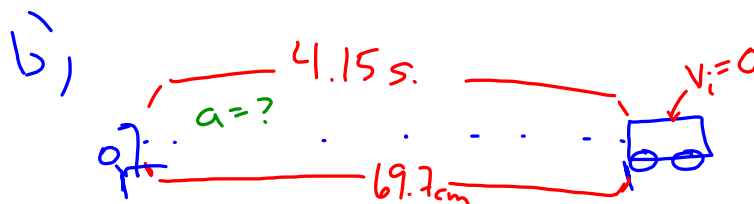
0 m/s

DATA

TIME
MASS
DISTANCE
 $g = -9.81 \text{ m/s}^2$

Feb 22-7:54 AM

Finding acceleration using the UAM template



c) $v_i = 0 \text{ m/s}$

$a = ?$

CHANGE IN
 $\Delta x = 69.7 \text{ cm}$
 $= .697 \text{ m}$

CHANGE IN
→ SUBTRACT
 $\Delta t = 4.15 \text{ s}$

d) $\Delta x = v_i \Delta t + \frac{1}{2} a \Delta t^2$

e) CONVERT?

$? \text{ m} = 69.7 \text{ cm} \times \frac{1 \text{ m}}{100 \text{ cm}} = .697 \text{ m}$

$.697 \text{ m} = 0 \text{ m/s} \cdot 4.15 \text{ s} + \frac{1}{2} (2) (4.15 \text{ s})^2$

$\frac{.697 \text{ m}}{8.61125 \text{ s}^2} =$

$\frac{\text{m}}{\text{s}^2} = a$

Feb 22-9:51 AM